IN THE CLAIMS

Claims 1-33 Canceled.

34. (Currently amended) A semiconductor device manufacturing method comprising the steps of:

generating a film-forming gas of (1) ~~by using any~~ one of a silicon-containing ~~silicon-contained~~ organic compound having a siloxane bond and a silicon-containing ~~silicon-contained~~ organic compound having a CH_3 group and (2) ~~in addition~~ H_2O;~~,~~

setting a flow rate ratio of H_2O to the silicon-containing ~~silicon-contained~~ organic compound to 4 or more; ~~and~~

adjusting ~~a gas~~ pressure of the film-forming gas to 1.5 Torr or more;

applying ~~a~~ power to the film-forming gas to generate a plasma thereof so as to react it, and thus forming a low-dielectric insulating film on a substrate;

generating a process gas containing at least ~~any~~ one of He, Ar, H_2 and deuterium;

generating a plasma by applying ~~a~~ power to the process gas; ~~and~~

bringing the low-dielectric insulating film into contact with the plasma of the process gas; and

removing a surface layer of the low-dielectric insulating film.

35. (Canceled)

36. (Currently amended) A semiconductor device manufacturing method according to claim 34~~35~~, wherein the step of removing the surface layer of the low-dielectric insulating film is followed by the further subsequent step of:

heating ~~increasing a temperature of~~ the low dielectric insulating film to 375 °C or more at an atmospheric pressure or a lower ~~low~~ pressure, and then bringing the low-dielectric insulating film into contact with a process gas having a CH_3 group, while the low-dielectric insulating film is not brought into contact with ambient ~~an~~ atmosphere.

37. (Currently amended) A semiconductor device manufacturing method according to claim 34, wherein C_xH_y (wherein x~~,~~ and y are each a positive integer), $C_xH_yF_z$ (wherein x and y are each 0 or a positive integer but not simultaneously 0, and z is a positive integer) or $C_xH_yB_z$ (wherein x~~,~~ and y are each 0 ~~(where, except the case x=y=0)~~ or a positive integer but not simultaneously 0, and z is a positive integer) is added to the film forming~~-~~ gas.

38. (Previously presented) A semiconductor device manufacturing method according to claim 34, wherein wirings or electrodes consisting mainly of a copper film are formed on the substrate.

39. (Currently amended) A semiconductor device manufacturing method comprising the steps of:

generating a film~~-~~forming gas of (1) ~~by using any~~ one of a silicon-containing ~~silicon-contained~~ organic compound having a siloxane bond and a silicon-containing ~~silicon-contained~~ organic compound having CH_3 group and (2) ~~in addition~~ H_2O~~;~~;

setting a flow rate ratio of H_2O to the silicon-containing ~~silicon-contained~~ organic compound to 4 or more~~;~~; and

adjusting ~~a gas~~ pressure of the film-forming gas to 1.5 Torr or more;

applying ~~a~~ power to the film~~-~~forming gas to generate a plasma thereof so as to react it, and thus forming a low-dielectric insulating film on a substrate; ~~and~~

annealing the low-dielectric insulating film in an atmosphere of a nitrogen gas or an inert gas at a temperature of 400 °C or more; and then

removing a surface layer of the low-dielectric insulating film.

40. (Canceled)

41. (Currently amended) A semiconductor device manufacturing method according to claim 39~~40~~, wherein the step of removing the surface layer of the low-dielectric insulating film is followed, without bringing the low-dielectric insulating film into contact

with ambient ~~an~~ atmosphere, by the further ~~subsequent~~ step of:

heating ~~increasing a temperature of~~ the low-dielectric insulating film to 375 °C or more at ~~an~~ atmospheric pressure or a lower ~~low~~ pressure, and then bringing the low-dielectric insulating film into contact with a process gas having a CH_3 group.

42.(Currently amended) A semiconductor device manufacturing method according to claim 39, wherein C_xH_y (wherein x~~,~~ and y are each a positive integer), $C_xH_yF_z$ (wherein x and y are each 0 or a positive integer, but not simultaneously 0, and z is a positive integer) or $C_xH_yB_z$ (wherein x~~,~~ and y are each 0 ~~(where, except the case x=y=0)~~ or a positive integer, but not simultaneously 0, and z is a positive integer) is added to the film forming~~,~~ gas.

43. (Currently amended) A semiconductor device manufacturing method according to claim ~~34~~ 39, wherein wiring electrodes consisting mainly of a copper film are formed on the substrate.

44. (Currently amended) A semiconductor device manufacturing method comprising the steps of:

generating a film~~-~~forming gas at a pressure below 1.0 Torr, said film-forming gas containing (1) ~~by using any~~ one of a silicon-containing ~~silicon-contained~~ organic compound having a siloxane bond and a silicon-containing ~~silicon-contained~~ organic compound having a CH_3 group and (2) ~~in addition~~ H_2O~~,~~ and

setting a flow rate ratio of H_2O to the silicon-containing ~~silicon-contained~~ organic compound to 12 or more;

~~increasing a temperature of~~ heating a substrate ~~up~~ to 200 °C or more but no higher than 400 °C ~~or less~~; and

applying ~~a~~ power ~~to the film forming gas~~ of a frequency below 1MHz to the substrate to bias the substrate and to generate a plasma ~~thereof~~ of the film-forming gas so as to react it, and thus forming a barrier insulating film on the heated substrate ~~whose temperature is raised~~.

45. (Canceled)

46. (Currently amended) A semiconductor device manufacturing method according to claim 44, wherein, ~~in the step of generating the film forming gas, a pressure of the film forming gas is adjusted to below 1.0 Torr and~~, in the step of forming the barrier insulating film, ~~a power of a frequency of below 1MHz is applied to the substrate to bias the substrate while at least the~~ power of ~~the~~ a frequency of 1MHz or more ~~out of the power of the frequency of below 1MHz or the power of the frequency of 1MHz or more~~ is applied to the film-forming gas~~, whose pressure is adjusted to 1.0 Torr or more,~~ to generate a plasma thereof so as to react it, and thus the barrier insulating film is formed.

47. (Currently amended) A semiconductor device manufacturing method according to claim 44, wherein dinitrogen monoxide (N_2O) is added, or nitrogen (N_2) or ammonia (NH_3) is added, or dinitrogen monoxide (N_2O) and ammonia (NH_3) are added to the film-forming gas.

48. (Currently amended) A semiconductor device manufacturing method according to claim 44, wherein C_xH_y (wherein x~~,~~ and y are each a positive integer), $C_xH_yF_z$ (wherein x and y are each 0 or a positive integer, but not simultaneously 0, and z is a positive integer) or $C_xH_yB_z$ (wherein x~~,~~ and y are each 0 ~~(where, except the case x=y=0)~~ or a positive integer~~,~~ ~~which are~~ but not simultaneously 0, and z is a positive integer) is added to the film forming- gas.

49. (Previously presented) A semiconductor device manufacturing method according to claim 44, wherein wirings or electrodes consisting mainly of a copper film are formed on the substrate.

50. (Currently amended) A semiconductor device manufacturing method comprising the steps of:

generating a film-forming gas of (1) ~~by using any~~ one of a silicon-containing ~~silicon-contained~~ organic compound having a siloxane bond and a silicon-containing ~~silicon-contained~~ organic compound having CH_3 group and (2) H_2O;~~,~~

setting ~~a~~ flow rate ratio of H_2O to the silicon-containing ~~silicon-contained~~ organic compound to 12 or more;

adjusting ~~a~~ pressure of the film-forming gas to below 1.0 Torr;

heating ~~increasing a temperature of~~ a substrate ~~up~~ to 200 °C or more but no higher than 400 °C ~~or less~~;

applying ~~a~~ power of a frequency of below 1MHz to the substrate to bias the substrate and to generate a plasma of the film-forming gas by the power of the frequency of below 1MHz so as to react the plasma, and thus forming a first insulating film;

again generating said ~~the~~ film-forming gas;

adjusting ~~a~~ pressure of the film-forming gas to 1.0 Torr or more;

heating ~~increasing a temperature of~~ a substrate ~~up~~ to 200 °C or more but no higher than 400 °C ~~or less~~;

and

applying ~~a~~ power of a frequency of below 1 MHz to the substrate to bias the substrate while applying ~~at least the~~ power at ~~of the~~ a frequency of 1 MHz or more ~~out of the power of the frequency of below 1 MHz or the power of the frequency of 1 MHz or more~~ to the film-forming gas, at a ~~whose~~ pressure of ~~is adjusted to~~ 1.0 Torr or more, to generate a plasma thereof so as to react it, and thus forming a second insulating film on the first insulating film, whereby ~~the~~ a barrier insulating film composed of the first insulating film and the second insulating film is formed.

51. (Currently amended) A semiconductor device manufacturing method according to claim 50, wherein dinitrogen monoxide (N_2O) is added, or nitrogen (N_2) or ammonia (NH_3) is added, or dinitrogen monoxide (N_2O) and ammonia (NH_3) are added to the film-forming gas.

52. (Currently amended) A semiconductor device manufacturing method according to claim 50, wherein C_xH_y (wherein x~~,~~ and y are each a positive integer), $C_xH_yF_z$ (wherein x and y are each 0 or a positive integer but not simultaneously 0, and z is a positive integer) or $C_xH_yB_z$ (wherein x~~,~~ and y are each 0 ~~(where, except the case x=y=0)~~ or a positive integer~~, which are~~ but not simultaneously 0, and z is a positive integer) is added to the film forming~~,~~ gas.

53. (Previously presented) A semiconductor device manufacturing method according to claim 50, wherein wirings or electrodes consisting mainly of a copper film are formed on the substrate.